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POSSIBLE USE OF A NARROW-FIELD STAR TRACKER ON THE NEW MILLENNIUM SS1 MISSION

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Abstract:

A Separated Spacecraft interferometer (SS1) Demonstration Mission with three spacecraft has been proposed for flight under the NASA New Millennium Technology Development Program. The rotation rate of the interferometer about the normal to the plane containing the three spacecraft must be determined accurately in order to make possible the detection of white light fringes from sources that have visual magnitudes as high as 14. A Kilometric Optical Gyro is planned for accomplishing this.

We have investigated a possible supplementary or alternate approach that makes use of a narrow-field star tracker on one of the two collector spacecraft. A very small beacon mounted on a short post from the other collector spacecraft can be viewed against reference stars to determine the rotation rate of the interferometer. Star tracker observations over a few hundred seconds appear sufficient to determine the sweep rate for starlight fringes in the interferometer to roughly one fringe per second. The problem of scattered sunlight from the other collector spacecraft can be reduced by bringing in the light from the beacon to the star tracker through a small separate aperture, a narrow band filter, and a fixed periscope.

Keywords:

separated spacecraft interferometer, fringe acquisition, narrow-field star tracker